

500 MATERIAL SPECIFICATIONS

500.01 APPLICABILITY/EXEMPTIONS

500.01.01 Applicability

The provisions of the Codes to this Standard shall apply to the construction, alteration, repair, equipment, use and occupancy, location, maintenance, removal and demolition of buildings or structures and accessory structures, or any appurtenances connected or attached to such buildings or structures.

The provisions of the Codes to this Standard relating to the construction, alteration, repair, enlargement, restoration, relocation, or moving of buildings or structures and their accessory structures shall not be applicable for existing buildings or structures and accessory structures identified and classified by the State or local jurisdiction as Historic Buildings when such buildings or structures are judged by the Building Official to be safe and in the public interest of health, safety, and welfare regarding any proposed construction, alteration, repair, enlargement, restoration, relocation, or moving of buildings within fire districts.

In general, non-residential buildings and structures will consist of the following occupancies (reference Chapter Four, Table 400, of the Standard Building Code):

- Factory-Industrial: facilities involving assembling and/or manufacturing operations, etc.
- Hazardous: facilities involving highly combustible, flammable, or explosive materials, etc.
- Storage: warehouse, private and public garages, parking decks, etc.

501.01.02 Exemption

When a structure is equipped with a sprinkler system meeting the requirements of NFPA (National Fire Protection Act) the following exceptions to the building code may be allowed:

1990 COBB COUNTY CODE SECTION 3-6-2 through 3-6-49

Multi - Family Sprinkler Ordinance.

- Fire Department access may be extended from 50 feet from the back of the parking area to the face of the building to a maximum of 125 feet to the face of the building.

Fire wall requirements:

For buildings up to 8,000 square feet per floor, no firewall is needed.

For buildings up to 10,000 square feet per floor, a two-hour firewall to the underside of roof deck is required at the approximate center.

For buildings over 10,000 square feet per floor, a four-hour fire wall extending up 36" above the roof surface and out flush with the roof overhang is required every 8,000 square feet.

Standard ½" gypsum wallboard may be substituted for the 5/8" type "X" gypsum wallboard relating to one-hour tenant separation walls.

Standard ½" gypsum wallboard may be substituted for the 5/8" type "X" gypsum wallboard and 5/8" plywood may be substituted for ¾" plywood relating to one hour floor-ceiling assemblies.

Fee Simple Townhouses may have one hour rated party walls in lieu of two-hour rated party walls.

Attic smoke stop at 3,000 square feet will be allowed in lieu of smoke stops between every unit.

Exit travel may be extended to a maximum of 35 feet in lieu of the existing 20 feet.

Tenants may travel by other tenants' doors and windows without those doors and windows being rated.

Interior finish shall be class "C" or better.

One hour rating of walls and doors of hazardous areas will not be required.

Unless otherwise specified within these Standards, all other requirements of applicable codes of Cobb County shall be complied with.

Certification of flow must be acceptable to the authority having jurisdiction. (Ordinance of 2-22-83)

501 CAST-IN-PLACE CONCRETE

501.01 GENERAL

501.01.01 Summary

Section Includes:

- Formwork for cast-in-place concrete with shoring, bracing, and anchorage
- Formwork accessories
- Form stripping
- Reinforcing steel for cast-in-place concrete
- Cast-in-place concrete, including concrete for the following: Concrete curing

501.01.02 Definitions

Unexposed Finish:

A general-use finish with no appearance criteria applicable to all formed concrete concealed from view after completion of construction.

Exposed Finish:

A general-use finish applicable to all formed concrete exposed to view and including surfaces that may receive a paint coating, if any.

501.01.03 Submittals

Product Data:

If requested, submit manufacturer's product data for the following:

- Formwork accessories
- Mechanical connectors for reinforcing steel
- End bearing splices for reinforcing steel
- Concrete admixtures
- Fibrous reinforcement
- Waterstops
- Grout
- Curing compound
- Bonding compound
- Epoxy bonding system

Aggregates:

Submit test reports showing compliance with specified quality and gradation.

Shop Drawings:

Submit shop drawings for fabrication and placement of the following:

Reinforcement:

Comply with ACI SP-66. Include bar schedules, diagrams of bent bars, arrangement of concrete reinforcement, and splices.

Show construction joints.

Include details of reinforcement at openings through concrete structures.

Include elevations of reinforcement in walls.

Show stirrup spacing.

Prepare shop drawings under seal of professional Structural Engineer registered in Georgia.

Quality Control Submittals:

Submit the following information related to quality assurance requirements specified:

Design data:

Submit proposed mix designs and test data before concrete operations begin. Identify for each mix submitted the method by which proportions have been selected

For mix designs based on trial mixtures, include trial mix proportions, test results, graphical analysis, and show required average compressive strength $f'(cr)$

Indicate quantity of each ingredient per cubic yard of concrete

Indicate type and quantity of admixtures proposed or required

Certifications:

Submit affidavits from an independent testing agency certifying that all materials furnished under this section conform to specifications

Certifications:

Provide certification from manufacturers of concrete admixtures that chloride content complies with specified requirements

Certifications:

Submit mill test certificates for all reinforcing steel furnished under this section, showing physical and chemical analysis

Include in chemical analysis for steel to be welded the percentages of carbon, manganese, copper, nickel, and chromium, and optionally the percentages of molybdenum and vanadium

Certifications:

Submit certifications signed by AWS Certified Welding Inspector (CWI) of prequalified welding procedures, qualifications of welding procedures unless prequalified, qualification of welding operators, and qualification of welders

Certifications:

Provide certification from an independent testing agency that mechanical connectors for reinforcing steel comply with specified requirements

Placement schedule:

Submit concrete placement schedule prior to start of any concrete placement operations. Include location of all joints indicated on drawings, plus anticipated construction joints

Submit batch tickets complying with ASTM C 685 or delivery tickets complying with ASTM C 94, as applicable, for each load of concrete used in the work

Cold weather concreting:

Submit description of planned protective measures Hot weather concreting.

Submit description of planned protective measures.

501.01.04 Quality Assurance

Codes and Standards:

Comply with the following documents, except where requirements of the contract documents or of governing codes and governing authorities are more stringent:

- ACI 301
- ACI 318
- ANSI/AWS D1.4
- CRSI Manual of Standard Practice

Qualification of Welds, Welding Operators, and Welders:

Perform welding procedure qualification, except for prequalified procedures, as required by ANSI/AWS D1.4, prior to executing any welding of reinforcing steel. Only AWS qualified welders or welding operators shall perform welding of reinforcing steel

Testing Agency Services:

Owner, if required, will engage testing agency to conduct tests and perform other services specified for quality control during construction

Only AWS Certified Welding Inspectors shall be used for tests and qualifications associated with welding of reinforcing steel

Source of Materials:

Obtain materials of each type from the same source for the entire project

Mock-Ups:

Cast mock-up of size indicated or as required to demonstrate typical joints and proposed texture and color, using specified concrete and formwork. Upon acceptance of visual qualities by the **Owner**, maintain sample panel exposed to view for duration of concrete work

501.01.05 Delivery, Storage, and Handling

Materials shall be delivered, handled, and stored in accordance with the specific manufacturer's recommendations.

501.01.05 Project Conditions

Cold-Weather Concreting:

Comply fully with the recommendations of ACI 306.

Well in advance of proposed concreting operations, advise the **Owner** of planned protective measures including but not limited to heating of materials, heated enclosures, and insulating blankets.

Hot-Weather Concreting:

Comply fully with the recommendations of ACI 305R.

Well in advance of proposed concreting operations, advise the **Owner** of planned protective measures including but not limited to cooling of materials before or during mixing, placement during evening to dawn hours, fogging during finishing and curing, shading, and windbreaks.

501.02 PRODUCTS

501.02.01 Formwork

Facing Materials

Unexposed finish concrete:

Any standard form materials that produce structurally sound concrete.

Exposed finish concrete:

Materials selected to offer optimum smooth, stain-free final appearance, and minimum number of joints.

Cylindrical Column Forms:

Weather-resistant tubes of metal, plastic, laminated paper, or fiber.

Formwork Accessories

Form coating:

Form release agent that will not adversely affect concrete surfaces or prevent subsequent application of concrete coatings.

Metal ties:

Commercially manufactured types; cone snap ties, taper removable bolt, or other type which will leave no metal closer than 1½" from surface of concrete when forms are removed, leaving not more than a 1" diameter hole in the concrete surface.

Accessories used with epoxy-coated reinforcing:

Epoxy coated or made of dielectric material or other approved materials.

Fillets:

Wood or plastic fillets for chamfered corners, in maximum lengths possible.

501.02.02 Reinforcing Materials

Reinforcing Bars:

Provide deformed bars complying with the following, except where otherwise indicated ASTM A 615, Grade 60.Do

Provide corrosion-protected bars in locations indicated:

Epoxy-coated reinforcing bars: ASTM A 775.

Reinforcing Bar Mats:

ASTM A 184, clipped type.

Provide mechanical connections for reinforcement splices of the type indicated and capable of developing at least 125% of the specified yield strength of the bar when tested in tension and compression.

Provide end-bearing splices complying with ACI 318 and of the type indicated.

Welded Wire Fabric:

ASTM A 185, cold-drawn steel, plain.

Reinforcing Accessories

Tie wire:

Black annealed type, 16½ gauge or as specified.

Supports:

Bar supports as specified conforming to specifications of CRSI "Manual of Standard Practice."

501.02.03 Concrete Materials

Portland Cement:

ASTM C 150, Type I, except where other type is specifically permitted or required

Fly Ash:

ASTM C 618, Type C or F

Water:

Potable

Aggregates:

Normal weight concrete: ASTM C 33

Maximum size of coarse aggregates, whichever is least

Admixtures - General:

Admixtures that result in more than 0.1% of soluble chloride ions by weight of cement are prohibited.

Air-Entraining Admixture:

ASTM C 260 and certified by manufacturer for compatibility with other mix components

Water-Reducing, Retarding Admixture:

ASTM C 494, Type D

Water-Reducing and Accelerating Admixtures:

ASTM C 494, Type E

High-Range Water-Reducing Admixture (Superplasticizer): ASTM C 494, Type F or G

Fibrous Reinforcement:

Polypropylene fibers designed and engineered specifically for secondary reinforcement of concrete

501.02.04 Miscellaneous Materials and Accessories

Reglets:

Provide reglets of not less than 26 gauge galvanized steel sheet at locations indicated. Temporarily fill reglets or cover openings to prevent intrusion of concrete or debris during installation.

Waterstops, General:

Provide waterstops at construction joints and as otherwise indicated, sized, and configured to suit joints.

Conform to ACI 301, paragraph 6.3

Vapor Retarder:

Membrane for installation beneath slabs on grade, resistant to decay when tested in accordance with ASTM E 154, and as follows:

Polyethylene sheet, not less than eight mils thick

Non-shrink Grout: CRD-C 621, Grade B Type: Provide nonmetallic type only

Burlap:

AASHTO M 182, Class 2 jute or kenaf cloth

Moisture-Retaining Cover:

ASTM C 171, and as follows:

Waterproofed paper

Polyethylene film

Polyethylene-coated burlap

Liquid Curing Compounds

Material - curing compounds:

Comply with ASTM C 309, Type 1

Non-yellowing formulation where subject to ultraviolet light

Underlayment Compound:

Self-leveling cementitious compound designed for pumping.

Bonding Compound:

Non-redispersable acrylic bonding admixture, ASTM C 1059, Type II.

Epoxy Bonding Systems:

ASTM C 881; type, grade, and class as required for project conditions.

Expansion Joint Filler:

Non-extruding bituminous type: ASTM D 1751.

Manhole Frame and Covers:

See Section 03410.

501.02.05 Concrete Mix Design

Review:

Do not begin concrete operations until proposed mix has been reviewed and approved by the owner.

Proportioning of Normal Weight Concrete:

Comply with recommendations of ACI 211.1.

Required Average Strength:

Establish the required average strength $f'(cr)$ of the design mix on the basis of trial mixtures as specified in ACI 301, and proportion mixes accordingly.

Specified Compressive Strength $f'(c)$ at 28 Days for locations as indicated on drawings:

Fill grout: 2000 psi

Walks and Drives: 3000 psi

Water retaining structures: 3000 psi

Fly Ash:

The **Contractor** may elect to replace a portion of the Portland Cement with fly ash up to a maximum of 25% by weight of cement plus fly ash.

Fibrous Reinforcement:

Add to mix at rate of 1.5 pounds per cubic yard of concrete, or as otherwise recommended by manufacturer for specific application.

Admixtures:

Use as specified.

Mix Adjustments:

The **Contractor** may submit for **Owner's** approval, at no additional cost to the **Owner**, requests for adjustment to approved concrete mixes when circumstances require.

501.02.06 Control of Mix in the Field

Slump:

A tolerance of up to 1" above approved design mix slump will be permitted for one batch in five consecutive batches tested.

Total Air Content:

A tolerance of + or - 1½% of approved design mix air content will be allowed for field measurements.

501.02.07 Concrete Mixing

On-Site Equipment:

Mix concrete materials in appropriate drum-type batch machine mixer in compliance with ASTM C 685.

Transit Mixers:

Mix concrete materials in transit mixers complying with requirements of ASTM C 94.

501.03 EXECUTION

501.03.01 Concrete Form Preparation

General:

Comply with requirements of ACI 301 for formwork, and as herein specified. The **Contractor** is responsible for design, engineering, construction of formwork, and for its timely removal.

Design:

Design and fabricate forms, as required.

Construction:

Construct and brace formwork to accurately achieve end results required by contract documents.

Tolerances for Formed Surfaces:

Comply with minimum tolerances established in ACI 117, unless more stringent requirements are indicated on the drawings.

Release Agent:

Provide either form materials with factory-applied non-absorptive liner or field-applied form coating.

501.03.02 Connection to Existing Concrete

Preparation:

At locations where new concrete is to join existing concrete, prepare existing surface by cleaning and applying bonding compound in accordance with manufacturer's instructions.

Doweled Connections:

At locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels, and pack solid with non-shrink grout.

501.03.03 Vapor Retarder Installation

General:

Place vapor retarder sheet over prepared base materials specified.

501.03.04 Placing Reinforcement

General:

Comply with requirements of ACI 301 and as herein specified.

Preparation:

Clean reinforcement of materials that adversely affect bond with concrete.

Placement:

Place reinforcement to achieve not less than minimum concrete coverage required for protection. Accurately position, support, and secure reinforcement against displacement.

Welding:

Welding of reinforcement is not permitted.

501.03.05 Joint Construction

Construction Joints:

Locate and install construction joints as indicated on drawings. If construction joints are not indicated, locate in a manner, which will not impair the strength and will have least impact on appearance, as acceptable to the **Owner**.

Isolation Joints:

Construct isolation joints in slabs poured on grade at points of contact with vertical components.

Expansion Joints:

Construct expansion joints where indicated. Install expansion joint filler to full depth of concrete.

Control Joints:

Construct contraction joints in slabs poured on grade to form panels of sizes indicated on drawings.

501.03.06 Installation of Embedded Items

General:

Set anchorage devices and other items required for other work connected to or supported by cast-in-place concrete, using templates, setting drawings, and instructions from suppliers of items to be embedded.

501.03.07 Concrete Placement

Preparation:

Provide materials necessary to ensure adequate protection of concrete during inclement weather before beginning installation of concrete.

Inspection:

Before beginning concrete placement, inspect formwork, reinforcing steel, and items to be embedded, verifying that all such work has been completed.

Placement - General:

Comply with requirements of ACI 304.

Placement in Forms:

Limit horizontal layers to depths that can be properly consolidated, but in no event greater than 24".

Slab Placement:

Schedule continuous placement and consolidation of concrete within planned construction joints.

Cold Weather Placement:

Comply with recommendations of ACI 306 when air temperatures are expected to drop below 40°F either during concrete placement operations or before concrete has cured.

Hot Weather Placement:

Comply with recommendations of ACI 305R when ambient temperature before, during, or after concrete placement is expected to exceed 90°F.

501.03.08 Finishing Formed Surfaces

Repairs, General:

Repair surface defects, including tie holes, immediately after removing formwork.

Unexposed Form Finish:

Repair tie holes and patch defective areas.

Exposed Form Finish:

Repair and patch defective areas with fins or other projections completely removed and smoothed.

501.03.09 Finishing Slabs

Finishing Operations - General:

Do not directly apply water to slab surface or dust with cement.

Use hand or power equipment only as recommended in ACI 302.1R.

Screeding:

Strikeoff to required grade and within surface tolerances indicated.

Bull Floating:

Immediately following screeding, bull float or darby before bleed water appears to eliminate ridges, fill in voids, and embed coarse aggregate.

Do not perform subsequent finishing until excess moisture or bleed water has disappeared and concrete will support either foot pressure with less than 1/4" indentation or weight of power floats.

Final floating:

Float to embed coarse aggregate, to eliminate ridges, to compact concrete, to consolidate mortar at surface, and to achieve uniform, sandy texture.

Troweling:

Trowel immediately following final floating.

Coordinate appearance and texture of required final finish with the **Owner** before application:

Float Finish:

As specified above.

Broomed Float Finish:

After floating and when water sheen has practically disappeared, apply uniform transverse corrugations approximately 1/16" deep, without tearing surface.

Trowel Finish:

As specified above.

Trowel and Fine Broom Finish:

Follow trowel finishing operation immediately with fine brooming to achieve slightly scarified surface.

Slab Surface Tolerances:

Achieve flat, level planes except where grades are indicated.

Floated finishes:

Depressions between high spots shall not exceed 5/16" under a 10' straightedge.

Troweled finishes:

Achieve a level surface plane so that depressions between high spots do not exceed 1/4" under a 10' straightedge.

Repair of Slab Surfaces:

Test slab surfaces for smoothness and to verify surface plane to tolerance specified and repair defects.

501.03.10 Concrete Curing and Protection

General:

Prevent premature drying of freshly placed concrete and protect from excessively cold or hot temperatures until concrete has cured.

Provide curing of concrete by one of the methods listed and as appropriate to service conditions and type of applied finish in each case.

Curing Period:

Not less than seven days for standard cements and mixes.

Not less than four days for high early strength concrete using Type III cement.

Formed Surfaces:

Cure formed concrete surfaces by moist curing with forms in place for full curing period or until forms are removed.

Surfaces Not in Contact with Forms:

Start initial curing as soon as free water has disappeared, but before surface is dry.

Keep continuously moist for not less than three days.

Begin final curing procedures immediately following initial curing and before concrete has dried. Apply curing compound at rate stated by manufacturer to conform to moisture-retention requirements specified. Use curing compounds only in locations permitted or required.

Avoid rapid drying at end of curing period.

During and following the curing period, protect concrete from temperature changes of adjacent air in excess of 5°F per hour and 50°F per 24 hours.

501.03.11 Shores and Supports

General:

Comply with recommendations of ACI 347 for shoring and re-shoring.

Re-shoring:

To avoid damage to partly cured concrete, remove shores and re-shore in a planned sequence. Locate and provide adequate re-shoring to safely support work without excessive stress or deflection.

501.03.12 Removal of Forms and Supports

Non-Load-Bearing Formwork:

Provided that concrete has hardened sufficiently that it will not be damaged, forms not actually supporting weight of the concrete or weight of the soffit forms may be removed after concrete has cured at not less than 50°F for 24 hours.

Load-Bearing Formwork:

Do not remove shoring and forms supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, until concrete has attained at least the specified compressive strength $f'(c)$ and until the **Contractor** has determined that the actual compressive strength attained is adequate to support the weight of the concrete and superimposed loads.

Keep reshores in place for a minimum of 15 days after placing upper tier, and longer if required, until concrete has attained at least the specified compressive strength $f'(c)$ and until the **Contractor** has determined that the actual compressive strength attained is adequate to support the weight of the concrete and superimposed loads.

Keep supports in place until heavy loads due to construction operations have been removed.

Test field-cured specimens to determine potential compressive strength of concrete for specific locations.

501.03.13 Miscellaneous Concrete Items

Fill-in:

Fill in holes and openings left in concrete structures for passage of work by other trades after such work is complete.

Equipment Bases and Foundations:

Provide machine and equipment bases and foundations, as indicated on drawings. Set anchor bolts at correct elevations, complying with diagrams or templates of equipment manufacturer.

Grout base plates and foundations as indicated with non-shrink grout.

Use nonmetallic grout for exposed conditions, unless otherwise indicated.

501.03.14 Concrete Repairs

Perform cosmetic repairs of concrete surfaces as specified under concrete application.

Perform structural repairs with prior approval of the **Owner** for method and procedure, using epoxy bonding systems.

501.03.15 Quality Control Testing During Construction

Composite Sampling and Making and Curing of Specimens:

ASTM C 172 and ASTM C 31.

Slump:

ASTM C 143. One test per strength test and additional tests, if concrete consistency changes.

Air Content of Normal Weight Concrete:

ASTM C 173 or ASTM C 231.

Concrete Temperature:

Test hourly when air temperature is 40°F or below.

Test hourly when air temperature is 90°F or above.

Test each time a set of strength test specimens is made.

Compressive Strength Tests:

ASTM C 39.

Compression test specimens:

Mold and cure one set of four standard cylinders for each compressive strength test required.

Testing for acceptance of potential strength of as-delivered concrete:

Obtain samples on a statistically sound, random basis.

Minimum frequency:

One set per 100 cubic yards or fraction thereof for each day's pour of each concrete class.

One set per 3,500 square feet of slab or wall area or fraction thereof for each day's pour of each concrete class.

When less than five cubic yards is placed in one day, the **Owner** may waive laboratory testing of specimens if adequate evidence of satisfactory strength is provided.

When the above testing frequency would provide fewer than five strength tests for a given class of concrete during the project, conduct testing from not less than five randomly selected batches, or from each batch if fewer than five.

Test one specimen per set at seven days for information unless an earlier age is required.

Test two specimens per set for acceptance of strength potential; test at 28 days unless other age is specified.

Retain one specimen from each set for later testing, if required.

Strength potential of as-delivered concrete will be considered acceptable if all of the following criteria are met:

- No individual test result falls below specified compressive strength by more than 500 psi.
- Not more than 10% of individual test results fall below specified compressive strength $f'(c)$.
- Average of any three consecutive strength test results equals or exceeds specified compressive strength $f'(c)$.

Evaluate construction and curing procedures and implement corrective action when strength results for field-cured specimens are less than 85% of test values for companion laboratory-cured specimens.

Removal of forms or supports:

Mold additional specimens and field-cure with concrete represented; test to determine strength of concrete at proposed time of form or support removal.

Test Results:

Testing agency shall report test results in writing to **Owner** and **Contractor** within 24 hours of the test.

Test reports shall contain the following data:

Project name, number, and other identification.

Name of concrete testing agency.

Date and time of sampling.

Concrete type and class.

Location of concrete batch in the completed work.

All information required by respective ASTM test methods.

Nondestructive testing devices, such as impact hammer or sonoscope, may be used at **Owner's** option for assistance in determining probable concrete strength.

The testing agency shall make additional tests of in-place concrete as directed by the **Owner**.

502 PRECAST CONCRETE STRUCTURES

502.01 GENERAL

502.01.01 Scope of Work

Furnish all materials, labor and equipment, and construct manholes, as shown on the drawings and as specified herein.

Manholes shall have an invert channel shaped to correspond with the lower half of the pipe. The top of the shelf shall be at the elevation indicated and shall be sloped to drain toward the flowing - through channel.

502.01.02 Related Work

Excavation, backfill, fill, and grading for pipe are included in Sections 503.03, 504.03 and 505.02.

Concrete is included in Section 501.

502.01.03 Submittals

Submit shop drawings showing details of construction, reinforcing, and joints to the **Owner**.

502.01.04 Inspection

The quality of all materials, the process of manufacture, and the finished sections shall be subject to inspection and approval by the **Owner**.

At the time of inspection, the sections will be carefully examined for compliance with the ASTM designation specified below and these Specifications, and with the approved manufacturer's drawings.

Imperfections may be repaired, subject to the approval of the **Owner**, after demonstration by the manufacturer that strong and permanent repairs result.

502.02 PRODUCTS

502.02.01 Precast Concrete Manholes

Precast concrete manhole barrel and eccentric top sections shall conform to Specifications for Precast Reinforced Concrete Manhole Sections, ASTM Designation C478, except as otherwise specified below. The method of construction shall conform to the drawings and the following additional requirements:

Barrel sections shall have tongue and groove joints. Joints shall have round rubber gaskets set in specially provided indentions. The round rubber "O"-ring gasket shall conform to ASTM C443 standard specifications. Flexible plastic gaskets (Ram-Nek or equal) meeting Federal Specifications SS-S210A "Sealing Compound, Preformed Plastic for Pipe Joints", Type I, Rope Form and AASHTO designation M-198 751, Type B, Flexible Plastic Gasket (Bitumen) are also acceptable.

Type I cement shall be used, except as otherwise approved.

The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on the inside of each precast section. Each section of the manhole must be inspected and stamped by an accredited testing laboratory.

Sections shall be cured by an approved method for at least 28 days.

Top sections shall be eccentric except precast concrete slabs shall be used where cover over the top of the pipe is less than four feet for all manholes.

Precast concrete slabs over top section, where required, shall be capable of supporting the overburden plus a live load equivalent to AASHTO H-20 loading.

Manhole steps shall be cast into the precast sections and shall conform to ASTM Specification C478. Steps shall be Plastic Step by M. A. Industries, Inc., or equal.

Holes in precast sections to receive sewer pipe shall be precast at the factory at the required locations. All precast holes shall have Kor-N-Seal (or equal) rubber boots.

The tops of bases shall be suitably shaped to mate with the precast barrel section.

Cast iron frames and covers shall be East Jordan Iron Works Model V-1480, standard; V-2480, bolt-down watertight; U.S. Foundry Model 360-E, standard; 360-E/ORS, bolt-down watertight; or equal.

502.03 EXECUTION

502.03.01 Installation

Manholes and other precast structures shall be constructed to the dimensions as shown on the drawings and as specified in these Specifications.

The base shall be cast-in-place concrete placed on a thoroughly compacted gravel sub-base. The tops of the cast-in-place bases shall be shaped to mate with the precast barrel section, and shall be adjusted to finish or specified grade.

Precast bases, conforming to all requirements of ASTM C478 and above listed requirements for precast sections, may be used.

Precast concrete structure sections shall be set to be vertical and with sections in true alignment with a 1/4" maximum tolerance to be allowed.

Holes in the concrete pipe sections required for handling or other purposes shall be plugged with a non-shrinking grout.

Where holes must be cut in the precast sections to accommodate pipes, coring shall be done prior to setting them in place.

Cast iron frames shall be placed, shimmed, and set in Portland cement mortar to the required grade. No more than three courses of leveling rings shall be used.

503 WATER

503.01 GENERAL

503.01.01 Scope of Work

Supply all labor, equipment, materials, and incidentals necessary to install and test all water supply piping and appurtenances as specified.

Work shall include but not be limited to all excavation, backfilling, sheeting, slope protection, drainage, concrete work, rip-rap, grading, and all other work necessary to complete the construction, installation, and testing of the pipe.

503.01.02 Qualifications

The pipe and fittings shall be designed, constructed, and installed in accordance with these Specifications as applicable.

503.01.03 Submittals and Testing

The **Contractor** shall submit to the **Owner** a list of materials to be furnished prior to start of construction.

Submit shop drawings to the **Owner**.

503.01.04 Inspection

All pipe and fittings installed under this contract may be inspected by the **Owner** at the site of manufacture for compliance with these Specifications.

503.01.05 Connection to Work by Others or Existing Lines

For existing lines or lines installed under other contracts to which piping of this contract must connect, the **Contractor** shall expose buried lines to confirm or determine end connection details, pipe material and diameter, and furnish and install appropriate piping, and make proper connections. Design shall include the requirements of Section 410.05.

503.02 PRODUCTS

503.02.01 General

All materials shall be of standard manufactured design that the manufacturer recommends for the service intended in accordance with AWWA or ASTM Standard Specifications.

All pipe and appurtenances shall be of the size shown on the drawings and all equipment of the same type shall be from one manufacturer.

Pipe materials shall be as follows:

- Mains (public) 4" and larger, ductile iron
- Mains (private) 6" and larger, ductile iron
- Service Lines, ¾" and larger, copper

503.02.02 Ductile Iron Pipe and Fittings

Ductile iron pipe shall meet the following requirements and be as specified hereinafter:

Ductile iron pipe shall be of the centrifugally cast type, either in metal or cast molds, and shall conform to ANSI A21.51 or AWWA C151. Ductile iron shall have a minimum tensile strength of 60,000 psi with minimum yield strength of 42,000 psi, pressure rated at a minimum of 350 PSI and

have a minimal wall thickness of ¼" unless field conditions determine that a heavier wall thickness is required. The pressure rating and manufacture date shall be shown on each piece. All pipes shall be furnished complete with all necessary glands, joint materials including rubber gasket lubricant, bolts, nuts, etc. Pipe furnished shall be manufactured by U.S. Pipe and Foundry; American Cast Iron Pipe; or equal in industry standard lengths.

All ductile iron joints used, unless otherwise noted, shall be push-on joint or as specified and shall meet the requirements of ANSI Specifications A 21.11 or AWWA C111, latest revisions.

Fittings:

All ductile iron pipefittings shall be of ductile iron or cast iron and shall be of a standard design for use with the pipe purchased under these specifications. Fittings shall conform to the following applicable specification:

Mechanical Joint fittings: Fittings with rubber gasket joints shall conform to ANSI Specification A 21.11. Bolts shall be low alloys, high strength, equal to "Acipally", "Usalloy", or "Corten" bolts.

The proper number of gaskets, bolts, and all necessary joint materials, plus one extra gasket for every 50 joints or fraction thereof, shall be furnished with the pipefittings.

Pipe and fittings shall have a cement mortar lining and a bituminous seal coat on the inside in accordance with ANSI A21.4 and be coated on the exterior with a 1.0 mils thick bituminous coat in accordance with ANSI A21.51. A ceramic coating shall be substituted for the cement mortar lining where shown on the drawings.

Polyethylene Encasement:

Where indicated on the drawings, the **Contractor** shall provide a polyethylene encasement over pipe, fittings, and valves. The material, installation, and workmanship shall conform to applicable sections of ANSI Standard A21.5. Installation shall be employed using flat tube polyethylene.

503.02.03 Copper Pipe

All copper pipes shall conform to Federal Specifications WW-T-799, Type "K" as a minimum with plain ends and lengths standardized at 12 feet.

503.02.04 Copper Tubing

All copper tubing shall conform to ASTM Designation B88 for the Type "K" Soft Temper and AWWA 7S-CR Type "K" and may be used in 20-foot straight lengths or 60/100-foot coils.

503.02.05 Gate Valves

All valves 3" to 16" in diameter shall be gate valves conforming to the requirements of AWWA Specification C-509. Sizes smaller than three inches shall meet Federal Specification WW-V-54, Class "A", rated for 200 psi working pressure. Gate valves shall be as manufactured by Dresser, Mueller, Darling, Clow Corporation, Kennedy, Walworth, or similar approved equal.

503.02.06 Butterfly Valves

All valves 16" and larger shall be butterfly valves of the tight closing, rubber-seat type and shall conform to the requirements of AWWA Specification C-504 for Class 150 B and as further specified herein. The butterfly valves shall be of the rubber-seat types that are securely fastened to the valve body. No metal-to-metal seating surfaces shall be permitted. Valves shall be bubble-tight at rated pressures with flow in either direction, and shall be satisfactory for applications involving throttling service and/or frequent operation and for applications involving valve operation after long periods of inactivity. Butterfly valves shall be as manufactured by BIF Industries, Henry Pratt Company, Dresser, or similar approved equal.

503.02.07 Air/Vacuum Release Valves

The valves shall have a cast iron body, cover and baffle, stainless steel float, bronze water diffuser, and Buna-N seat with threaded fittings. The valves shall be manufactured by GA Industries, APCO Valve and Primer Corporation, or equal.

503.02.08 Corporation Stops

Corporation stops shall be all brass or bronze suitable for 200 psi operating pressure and similar to Mueller Co. H-15000 or Hays 5200.

503.02.09 Valve Boxes, Valve Assemblies, Valve Pads

Valve boxes shall be cast iron two or three piece with cast iron covers. The barrel shall be one or two-piece, screw type, having 5¼" shaft. Covers shall have "WATER" cast into the top. Valve stem extensions shall be provided and installed for all valves where the operating nut is 5 feet or deeper. Where directed, valve assemblies shall include fully adjustable valve box and extension stem combinations equal to American Flow Control "Trench Adapter". Concrete Valve pads/collars are required for all valve boxes not in a paved area. Concrete valve markers shall be furnished and installed on existing roads where directed by Cobb County.

503.02.10 Flexible (Transition) Couplings

Flexible couplings shall be Catalog No. 441 as manufactured by Smith-Blair, Style No. 38, as manufactured by Dresser Manufacturing Company or equal.

503.02.11 Fire Hydrants

Fire hydrants shall conform to AWWA C502-85 for dry-barrel fire hydrants. Hydrants shall be traffic types with safety flange, which allows the valve to remain closed when the hydrant is broken or damaged above or near grade level. The design of hydrant shall be of the compression type with main valves and "O" ring seal between the operating nut and the bonnet. Hydrant color shall be silver.

Hydrant inlet shall be 6", mechanical joint with harnessing lugs. Hydrant main valve opening shall be 5¼". Valve seats shall be bronze to bronze.

Operating nut shall be solid pentagon, 1½" measured flat at point (31/32 on side). Operating nut shall turn counter clockwise to open.

Hydrant shall have two 2½" diameters and one 4½" diameter nozzles. Nozzle threads shall be the standard adopted by NBFU. Nozzles shall all have gasket caps fitted with chain.

The following fire hydrants are approved for installation in Cobb County:

<u>Manufacturer</u>	<u>Model</u>
American AVK	Models 2700 and 2780
Mueller	Centurion & Improved
U. S.	M-94
Kennedy	K81-A
M&H	Models 129 and 929
Clow	Medallion
American-Darling	B-62B

Materials shall conform to AWWA Standard C-502, latest revision.

503.02.12 Curb Stops

Curb stops shall be of bronze construction with tee handle operator. Curb stops shall be Hays 5060 or approved equal.

503.02.13 Tapping Sleeves

Tapping sleeves shall be Class 250 pipe for 200 psi cold water working pressure. Sleeves shall be M & H Fig. #74-M, Mueller #H-615, or approved equal.

503.02.14 Tapping Saddles

Double Strap Saddles: Saddles shall be either Smith Blair 313 Double Strap or Superior Style 32.

503.02.15 Adapters and Unions

Copper female iron pipe adapters shall be Hays 5600 CF or approved equal in Mueller. Copper by copper unions shall be Hays 5615 CF or approved equal in Mueller. Copper by male iron pipe adapters shall be Hays 5605 or equal in Mueller.

503.03 EXECUTION

503.03.01 General

Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe or coatings. Pipe or fittings shall not be dropped. All pipe or fittings shall be examined before laying, and no piece shall be installed which is found to be defective. Any damage to the pipe coatings shall be repaired as directed by the **Owner**.

Pipe and fittings shall be subjected to a careful inspection just prior to being laid or installed. If any defective pipe is discovered after it has been laid, it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional expense to the **Owner**. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work, and when installed or laid, shall conform to the lines and grades required.

Unless specifically indicated otherwise, underground piping shall slope uniformly between joints.

When constructing piping, **Contractor** shall exercise extreme care to protect all existing underground utilities, and all existing structures from damage.

503.03.02 Installation

Pipe and fittings shall be installed using bedding, as shown on the drawings and in accordance with requirements of AWWA Standard Specifications except as otherwise provided herein. A firm, even bearing throughout the length of the pipe shall be constructed by tamping selected material at the sides of the pipe up to the springline. **BLOCKING SUPPORTS WILL NOT BE PERMITTED**. Bell holes shall be hand excavated to insure uniform bearing along the pipe barrel.

All pipes shall be sound and clean before laying. When laying is not in progress, including lunchtime, the open ends of the pipe shall be closed by watertight plug or other approved means. Good alignment shall be preserved in laying. The deflection at joints shall not exceed that recommended by manufacturer.

When cutting pipe is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be used with a bell shall be beveled to conform to the manufactured spigot end. Lining shall be undamaged.

Push-on joints shall be made in strict accordance with the manufacturer's instructions. Pipe shall be laid with bell ends looking ahead. A rubber gasket shall be inserted in the groove of the bell end of the pipe, and the joint surfaces cleaned and lubricated. The plain end of the pipe is to be aligned with the bell of the pipe to which it is to be joined, and pushed home with a jack or by other means. After joining the pipe, a metal feeler shall be used to make certain that the rubber gasket is correctly located.

Joints at fittings, and where designated on the drawings and/or as specified, shall be in accordance with the "Notes on Method of Installation" under ANSI Specification A21.11 and the instructions of the manufacturer. To assemble the joints in the field, thoroughly clean the joint surfaces and rubber gasket with soapy water before assembly.

Unless otherwise noted, underground ductile iron piping shall be push-on with mechanical joint fittings, valves, fire hydrants, etc.

All fittings and other appurtenances needed upon the pipelines shall be set and jointed as indicated on the drawings or as required by the manufacturer.

The **Contractor** shall arrange, if requested, for the pipe manufacturer to furnish information and supervise the installation of at least the first five push-on joints.

The **Contractor** shall carefully regulate his equipment and construction operations such that the loading of the pipe does not exceed the loads for which the pipe is designed and manufactured. Any pipe damaged during construction operations shall be replaced at the **Contractor's** expense.

All piping shall be properly and adequately supported. Supports shall be provided as indicated on the drawings. If the method of support is not indicated on the drawings, piping shall be supported as directed by the **Owner**.

The proper number of gaskets and all necessary joint materials, plus one extra gasket for every 50 joints or fraction thereof, shall be furnished with the pipe and fittings.

Pipe embedment shall conform to manufacturer's recommendations. Bedding and backfill for pipe shall be as shown on the drawings.

503.03.03 Pipe Supports and Thrust Blocks

All piping shall be properly and adequately supported. Concrete piers and pads shall be provided as indicated on the drawings. If the method of support is not indicated on the drawings, exposed piping shall be supported as directed by the **Owner**.

Longitudinal thrust along pressurized pipelines at bends, tees, reducers, and caps/plugs shall be counteracted by enough weight of concrete to counterbalance the vertical and horizontal thrust forces.

Joints shall be protected by felt roofing paper prior to placing concrete thrust block.

Bearing area of thrust blocks shall be adequate to prevent any movement of the fitting and shall be of the size and dimensions as shown on the drawings.

Concrete for thrust blocking shall be 3,000-psi minimum. Concrete shall be placed against undisturbed material, and shall not cover joints, bolts, or nuts, or interfere with the removal of any joint. Wooden side forms shall be provided for thrust blocks.

Restrained joints, anchor couplings, rodding, wedge action retainer glands, etc. shall be used in accordance with standard details and/or where specifically indicated.

503.03.04 Pressure and Leakage Tests of Underground Pressure Piping

Hydrostatic pressure and leakage tests shall conform with Section 4 of AWWA C600 Specification with the exception that the **Contractor** shall furnish all gauges, meters, pressure pumps, and

other equipment needed to test the line. The pressure gauge used for testing shall be laboratory calibrated suitable for the test pressure required.

The pressure required for the field hydrostatic pressure test shall be 150% of the maximum operating pressure of the section, or the pressure class of the pipe, whichever is greater. The **Contractor** shall provide temporary plugs and blocking necessary to maintain the required test pressure. Corporation cocks at least ¾" in diameter, pipe riser, and angle globe valves shall be provided at each pipe dead-end and high point in order to bleed air from the line. Duration of pressure test shall be at least two hours. The cost of these items shall be included as a part of testing.

A record of successful pressure testing results will be provided by the **Contractor** to the Cobb County Water System Inspector at the time of observing the leakage testing.

The leakage test shall be a separate test at the maximum operating pressure as determined by the **Owner** following the pressure test and shall be of not less than two hours duration. All exposed pipes, fittings, valves, and joints will be carefully examined during the tests and all leaks evident at the surface shall be repaired and leakage eliminated regardless of total leakage as shown by test. Lines which fail to meet tests shall be repaired and retested as necessary until test requirements are complied with. Defective materials, pipes, valves, and accessories shall be removed and replaced. The pipelines shall be tested in such sections as may be directed by the **Owner** by shutting valves or installing temporary plugs as required. The line shall be filled with water and all air removed and the test pressure shall be maintained in the pipe for the entire test period by means of a force pump to be furnished by the **Contractor**. Accurate means shall be provided for measuring the water required to maintain this pressure. The amount of water required is a measure of the leakage.

The amount of leakage, which will be permitted, shall be in accordance with AWWA C600 Standards for all pressure lines. No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SD\sqrt{P}}{133200}$$

"L" is the allowable leakage, in gallons per hour; "S" is the length of pipe tested, in feet; "D" is the nominal diameter of the pipe, in inches; and "P" is the average test pressure during the leakage test, in pounds per square inch gauge.

The **Contractor** may backfill the trench before he tests the line, if he so desires, but he shall open up the trench at his own expense to repair any leaks.

The **Contractor** must submit his plan for testing to the **Owner** for review at least three days before starting the test. The **Contractor** shall remove and adequately dispose of all temporary blocking material and equipment after completion and acceptance of the field hydrostatic test, unless otherwise directed by the **Owner**. Any damage to the pipe coating shall be repaired by the **Contractor**. Lines shall be totally free and clean prior to final acceptance.

503.03.05 Cleaning Mains

At the conclusion of the work, the **Contractor** shall thoroughly clean the new pipe line by flushing with water or other means to remove all dirt, stones, pieces of wood, or other materials, which may have entered during the construction period. If obstructions remain after this cleaning, they shall be removed.

503.03.06 Disinfection

Upon completion of the pressure and leakage test, the section of pipe to be disinfected shall be initially flushed using potable water. Flushing shall be accomplished at a minimum velocity of 2.5 feet per second and shall continue until the water runs clear.

Disinfection shall be accomplished by the continuous feed chlorination method in accordance with AWWA C601. The following steps shall be employed:

- Begin filling main at a constant, measured rate with potable water. As water first flows in, begin adding chlorine at a point no more than ten feet from the beginning of the new main.
- Add chlorine at a rate to attain a 25 mg/1 chlorine concentration. The acceptable method is by preparing a 1% solution with sodium hypochlorite or calcium hypochlorite. The required amount of chlorine to produce a 25 mg/1 concentration in 100 feet of pipe is as follows:

<u>Pipe Diameter</u>	<u>100% Chlorine (lb.)</u>	<u>1% Chlorine Solutions (gal.)</u>
4	.013	0.16
6	.030	0.36
8	.054	0.65
10	.085	1.02
12	.120	1.44
16	.217	2.60
18	.275	3.30
20	.339	4.06
24	.488	5.85

- Continue adding chlorine at a rate to attain a minimum concentration of 25 mg/1. Measure the rate at regular intervals as given in AWWA M12 or with a high range test kit. Chlorine application shall continue until the entire main is filled.
- The chlorinated water shall be retained in the water main for a minimum of 24 hours. At the end of the 24-hour period, the water in all portions of the main shall have a minimum chlorine residual of 10 mg/1.

The heavily chlorinated water shall be flushed in a manner, which is not detrimental to the environment. The method proposed shall be submitted to and approved by the **Owner** prior to discharge. Final flushing shall continue until the chlorine residual is less than 2 mg/1.

Contractor shall coordinate sampling with the Cobb County-Marietta Water Authority (CCMWA) no earlier than 16 hours after final flushing. The CCMWA will obtain bacteriological samples for testing.

If bacteriological test results are unsatisfactory, the main shall either be flushed with potable water or re-disinfected by the **Contractor**, as directed by the **Owner**, prior to obtaining additional samples. Satisfactory bacteriological test results shall be obtained prior to placing the new main in service.

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504 SANITARY SEWER

504.01 GENERAL

504.01.01 Scope of Work

Supply all labor, equipment, materials, and incidentals necessary to install and test all piping and appurtenances as specified.

Work shall include but not be limited to all excavation, backfilling, sheeting, slope protection, drainage, concrete work, rip-rap, grading, and all other work necessary to complete the construction, installation, and testing of the pipe.

504.01.02 Qualifications

The pipe and fittings shall be designed, constructed, and installed in accordance with these Specifications as applicable.

504.01.03 Submittals and Testing

If required, the **Contractor** shall submit to the **Owner** a list of materials to be furnished prior to the start of construction.

Submit shop drawings to the **Owner**, if required.

504.01.04 Inspection

All pipe and fittings to be installed under this contract may be inspected by the **Owner** at the site of manufacture for compliance with these Specifications.

504.01.05 Connection to Work by Others or Existing Lines

For existing lines or lines installed under other contracts, to which piping of this contract must connect, the **Contractor** shall expose buried lines to confirm or determine end connection details, pipe material and diameter, furnish and install appropriate piping, and make proper connections.

504.02 PRODUCTS

504.02.01 Ductile Iron Pipe and Fittings

Ductile iron pipe shall meet the following requirements and be as specified hereinafter:

All ductile iron pipe used for below-grade service in the project shall have push-on joints and shall meet the requirements of ANSI A21.11 OR AWWA C111, latest revisions. Ductile iron pipe used in the project for above-ground service or in below-ground vaults shall have flanged joints conforming to the requirements of ANSI A21.15, latest revision.

All ductile iron joints used in the project, unless otherwise noted, shall be push-on or as specified and shall meet the requirements of ANSI Specifications A 21.11 or AWWA C111, latest revisions.

Fittings:

Mechanical Joint Fittings:

Fittings shall be ductile iron compact fittings conforming to ANSI A21.53. The rubber gasket joints shall conform to ANSI A21.11. Bolts shall be low alloy, high strength equal to "Acapolly", "Usalloy", or "Corten" bolts.

Flanged Fittings:

Shall conform to ANSI A21.10 or A21.11 and shall have flanges faced and drilled in conformance with ANSI Standard A21.15. Joints shall be installed with full ring rubber gasket. Bolts shall be low alloy, high strength equal to "Acipolly", "Usalloy", or "Corten" bolts.

504.02.02 Other Pipe Material

Other pipe materials for 10" interceptors and larger may only be considered and approved after evaluation for compliance with specifications used by Cobb County for pipe installation.

504.03 EXECUTION

504.03.01 General

Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe or coatings. Pipe or fittings shall not be dropped. All pipe or fittings shall be examined before laying, and no piece shall be installed which is found to be defective. Any damage to the pipe coatings shall be repaired as directed by the **Owner**.

Pipe and fittings shall be subjected to a careful inspection just prior to being laid or installed. If any defective pipe is discovered after it has been laid, it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional expense to the **Owner**. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work, and when installed or laid shall conform to the lines and grades required.

Unless specifically indicated otherwise, underground piping shall slope uniformly between joints.

Contractor shall exercise extreme care when constructing piping to protect all existing underground utilities and all existing structures from damage.

504.03.02 Installation

Pipe and fittings shall be installed using bedding, as shown on the drawings and in accordance with requirements of AWWA Standard Specifications, except as otherwise provided herein. A firm even bearing throughout the length of the pipe shall be constructed by placing and tamping granular bedding material at the sides of the pipe up to the springline. **BLOCKING WILL NOT BE PERMITTED.** Bell holes shall be hand excavated to insure uniform bearing along the pipe barrel.

All pipes shall be sound and clean before installing. When installing is not in progress, including lunchtime, the open ends of the pipe shall be closed by watertight plug or other approved means. Good alignment shall be preserved in laying. The deflection at joints shall not exceed that recommended by manufacturer.

When cutting pipe is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be used with a bell shall be beveled to conform to the manufactured spigot end. Lining shall be undamaged.

Push-on joints shall be made in strict accordance with the manufacturer's instructions. Pipe shall be laid with bell ends looking ahead. A rubber gasket shall be inserted in the groove of the bell end of the pipe, and the joint surfaces cleaned and lubricated. The plain end of the pipe is to be aligned with the bell of the pipe to which it is to be joined, and pushed home with a jack or by other means. After joining the pipe, a metal feeler shall be used to make certain that the rubber gasket is correctly located.

Joints at fittings, and where designated on the drawings and/or as specified, shall be in accordance with the "Notes on Method of Installation" under ANSI Specification A21.11 and the instructions of

the manufacturer. To assemble the joints in the field, thoroughly clean the joint surfaces and rubber gasket with soapy water before assembly.

Unless otherwise noted, underground piping shall be push-on.

All fittings and other appurtenances needed upon the pipelines shall be set and jointed as indicated on the drawings or as required by the manufacturer.

The **Contractor** shall arrange, if requested, for the pipe manufacturer to furnish information and supervise the installation of at least the first five push-on joints.

The **Contractor** shall carefully regulate his equipment and construction operations such that the loading of the pipe does not exceed the loads for which the pipe is designed and manufactured. Any pipe damaged during construction operations shall be replaced at the **Contractor's** expense.

All piping shall be properly and adequately supported. Supports shall be provided as indicated on the drawings. If the method of support is not indicated on the drawings, piping shall be supported as directed by the design consultant.

The proper number of gaskets and all necessary joint materials, plus one extra gasket for every 50 joints or fraction thereof, shall be furnished with the pipe and fittings.

Pipe embedment shall conform to manufacturer's recommendations. Bedding and backfill for pipe shall be as specified herein and/or shown on the drawings.

504.03.03 Bedding of Sewer Pipe

Unless otherwise indicated, bedding for all sewer pipes shall be Class B. Class B bedding shall be defined as that method of bedding trench conduits in which the conduit is set in thoroughly tamped, compacted, granular materials placed to the trench width B and up to the centerline of the conduit. The remainder of the conduit is entirely surrounded to a height of at least one foot above its top by densely compacted backfill carefully placed by hand to completely fill all spaces above and adjacent to the conduit. Compliance with Section 410.060.02 is required.

504.03.04 Testing of Underground Gravity Sewers

- A. Infiltration of groundwater into sewer line shall not exceed 100 gal/day per inch of diameter per mile of sewer. All confirmed and/or visible leaks shall be repaired whether or not infiltration limits are exceeded.
- B. **Contractor** shall air test all gravity lines following completion of construction and pipe cleaning. **Contractor** shall furnish all necessary equipment and materials for testing including but not limited to pressure gauges, plugs, pumps, bulkheads, miscellaneous piping, etc. The following procedures shall be used:
 - 1. The **Contractor** shall isolate the test section with required plugs, bulkheads, etc.
 - 2. The **Contractor** shall pressurize the test section to 3.5 psi greater than the average back pressure of groundwater around the sewer (add 0.43 psi to test pressure for each vertical foot that the groundwater is above the top of the pipe).
 - 3. Allow 3 minutes for the pressure to stabilize.
 - 4. The pressure shall not decrease more than 0.5 psi during the time periods shown:
(See next page)

Time/100'		
Pipe Diameter (Inches)	Minutes	Seconds
8	1	12
10	1	30
12	1	48
14	2	00
15	2	06
16	2	12
18	2	24
20	2	48
21	3	00
24	3	36
27	4	12
30	4	48
36	6	00

- C. Subject to the approval of the **Owner**, an exfiltration test may be used to test the gravity sewer. The maximum allowable exfiltration shall be 50 gpd per inch diameter per mile when subjected to a test pressure of 10' of water head, or the pressure from filling manholes to their top, whichever is less.
- D. All PVC pipe must pass a 7.5% deflection test as follows:
Not before 30 days after pipe is laid and backfill placed, the Contractor shall test the pipe for deflection. A mandrel, sized to permit up to 7.5% deflection, shall be used.

SDR-35 PVC PIPE			
Nominal Pipe Size	Average Inside Diameter	Base Inside Diameter	7 1/2 % Deflection Mandrel
6	5.893	5.742	5.31
8	7.891	7.665	7.09
10	9.864	9.563	8.84
12	11.737	11.361	10.51
15	14.375	13.898	12.86

- E. If the section fails to meet the infiltration, deflection, and/or air test requirements, the **Contractor** shall determine the source(s) of leakage or deflection and make necessary repairs and retest the repaired section, all at no additional cost to **Owner**.

PRESSURE AND LEAKAGE TESTS OF UNDERGROUND PRESSURE PIPING

- A. Hydrostatic pressure and leakage tests for sewage force mains shall be conducted using potable water and test procedures conforming with Section 4 of AWWA C600 with the exception that the **Contractor** shall furnish all gauges, meters, pressure pumps and other equipment needed to test the line. The pressure gauge used for testing shall be laboratory calibrated suitable for the test pressure required. The **Contractor** must submit this plan for testing to the **Owner** for review at least three days before starting the test.
- B. The pressure required for the field hydrostatic pressure test shall be 150% of the maximum operating pressure of the section, or the pressure class of the pipe, whichever is greater. The Contractor shall provide temporary plugs and blocking necessary to

maintain the required test pressure. Corporation cocks at least 3/4 –inches in diameter, pipe riser and angle globe valves shall be provided at each pipe dead-end and high point in order to bleed air from the line. Duration of pressure test shall be at least 2 hours. The cost of these items shall be included as a part of work.

- C. The leakage test shall be a separate test at the maximum operating pressure as determined by the **Owner** following the pressure test and shall be of not less than 2 hours duration. All exposed pipes, fittings, valves and joints will be carefully examined during the tests and all leaks evident at the surface shall be repaired and leakage eliminated regardless of total leakage as shown by test. Lines which fail to meet tests shall be repaired and retested as necessary until test requirements are complied with. Defective materials, pipes, valves and accessories shall be removed and replaced. The pipe lines shall be tested in such sections as may be directed by the **Owner** by shutting valves or installing temporary plugs as required. The Line shall be filled with water and all air removed and the test pressure shall be maintained in the pipe for the entire test period by means of a force pump to be furnished by the **Contractor**.

Accurate means shall be provided for measuring the water required to maintain this pressure. The amount of water required is a measure of the leakage.

- D. The amount of leakage which will be permitted shall be in accordance with AWWA C600 Standards for all pressure lines. No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SDP}{133,200}$$

In which "L" is the allowable leakage, in gallons per hour; "S: is the length of pipe tested, in feet; "D" is the nominal diameter of the pipe, in inches; and "P" is the square root of the average test pressure during the leakage test, in pounds per square inch gauge.

- E. The **Contractor** may backfill the trench before he tests the line if he so desires, but he shall open the trench at his own expense to repair any leaks.
- F. The **Contractor** shall remove and adequately dispose of all temporary blocking material and equipment after completion and acceptance of the field hydrostatic test, unless otherwise directed by the **Owner**. The Contractor shall repair any damage to the pipe coating.

504.03.05 Cleaning Mains

At the conclusion of the Work and prior to pressure testing, the **Contractor** shall thoroughly clean the new pipeline by flushing with water or other means to remove all dirt, stones, and pieces of wood or other material that may have entered during the construction period. The flushing water and debris will be trapped at the last downstream manhole and removed from the system. If, after this clearing, obstructions remain, they shall be removed.

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505 STORM DRAINAGE

505.01 MATERIALS

Concrete pipes shall be reinforced within the right-of-way, but may be plain pipe outside of the right-of-way.

Concrete Pipe:

Flat bottom and circular pipe sections shall be laid in a prepared trench with socket ends pointing upstream. Sections may be joined by bituminous plastic cement joints, rubber-type gasket joints, "O" ring gasket joints, or pre-formed plastic gasket joints. In bituminous plastic cement joints, the annular space shall be filled with joint material, and the inside of each joint wiped smooth. Rubber-type, "O" ring, and pre-formed plastic gasket joints shall be installed in accordance with the manufacturer's recommendations.

Metal storm drain pipe shall conform to the following standards:

- ASTM A849-88, and/or
- AASHTO M36/M36M-86, and/or,
- ASTM A760/A760M-85, as appropriate, and as revised and updated, and shall be chosen from the following list:

Galvanized Corrugated Metal (Steel) Pipe, Bituminous Coated

Aluminum Corrugated Metal (Steel) Pipe

Aluminized Corrugated Metal (Steel) Pipe

Concrete lined Galvanized Corrugated Metal (Steel) Pipe, Bituminous Coated

Concrete lined Aluminized Corrugated Metal (Steel) Pipe.

NOTE: All corrugated metal pipes (CMP) shall be furnished with rolled ends providing at least two annular corrugations on each end.

505.02 INSTALLATION

Workmanship and finish:

Metal culvert pipe on which the coating has been bruised or broken either in the shop or in shipping, or which shows defective workmanship, shall be rejected. Among others, the following defects are specified as constituting poor workmanship and the presence of any or all of them in any culvert pipe shall constitute sufficient cause for rejections:

- Uneven laps
- Elliptical shaping of round pipe (5% out-of-round CMP max allowed)
- Variation from a straight center line
- Ragged or diagonal sheared edges
- Loose, unevenly lined or spaced rivets
- Poorly formed rivet heads
- Unfinished ends
- Illegible brands
- Lack of rigidity
- Bruised, scaled, or broken coating
- Dents or bends in the metal itself
- Chipped or broken concrete lining
- Improper bands

Joint Coupling:

Field joints shall be made with bands of the same base metal and coating as the metal pipe. Bands shall be of the hugger type designed to fully engage at least one annular corrugation at the end of

each metal pipe around its entire circumference. Minimum band width shall equal the centerline length of four annular corrugations. Bands shall conform to current ASTM/AASHTO industry standards as to securing bolts, their number, and placement. Other equally effective methods of connecting the coupling bands may be used if approved by the Manager of the Stormwater Management Division or his designee prior to installation.

Gauge Determination and Tolerances:

The gauge of the culvert metal will be determined from the thickness of the steel sheets prior to the galvanizing or aluminizing. The mean thickness and the permissible variations for each gauge are as shown:

WEIGHT AND GAUGE TOLERANCES				
Gauge Number	Weight Oz. Per Sq. Ft	Mean* Thickness, In.	Permissible variation in thickness in inches for coil width in inches	
			up to 15	Over 15 to 32, incl.
8	112.5	0.1644	0.008	0.009
10	92.5	0.1345	0.008	0.009
12	72.5	0.1046	0.008	0.009
14	52.5	0.0747	0.007	0.007
16	42.5	0.0598	0.007	0.007
* Thickness measured on tangent of corrugation.				

Corrugated Aluminum or Steel Pipe and Pipe-Arches:

Pipe sections shall be laid in a prepared trench outside laps of circumferential joints pointing upstream and with longitudinal joints at the sides. Coupling bands, fastened by two or more bolts, shall join the sections. The space between adjoining sections shall be not more than the width of one corrugation.

All damaged spots in galvanized or aluminized coating that expose the base metal shall be repaired according to directions of the manufacturer before the structure is backfilled. All damaged spots in bituminous coating that expose the base metal shall be rerouted with asphalt before the structure is backfilled.

Elongation:

Elongation of metal pipe 60" and larger in diameter shall be as shown on the plans. The contractor shall order the elongation of the vertical axis of the pipe to be done in the shop. Corrugated metal pipe shall be shipped with wire-ties in the pipe ends. Wire-ties shall be removed as soon as possible after the fill is completed.

Before allowing any traffic over a storm drain, the developer shall provide an adequate depth and width of compacted backfill to protect the structure from damage or displacement. Minimum soil cover shall be 12". Any debris or silt that constricts the flow through a pipe shall be removed by the developer as often as necessary to maintain drainage. All pipe structures shall be cleaned before the work is accepted. Any damage or displacement that may occur due to traffic or erosion shall be repaired or corrected to the satisfaction of Cobb County at the developer's expense.

Minimum Clearances Area:

One foot between the bottom of the base or sub-base, if used, and the exterior crown of the culvert.

A minimum of 1/2-foot between underground utilities and exterior crown or invert of culverts.

One foot between finished grade and exterior crown of the culvert.

Trench construction for storm drainage pipe shall be in accordance with State Highway Standard 1030D (or most current).

Storm drainage pipe shall be bedded in Type 57 gravel, if firm soil is not available.

505.03 PILINGS

Bridge pilings shall be driven to State highway load standards for loading. Certification of pile load shall be by a registered professional engineer.

505.04 CHANGES

Changes in construction plans caused by field conditions shall be made at the direction of the Development and Inspections Division with the cost of such changes to be paid by the developer.

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506 STREETS AND RIGHT-OF-WAY

All street and infrastructure construction performed within right-of-way shall be in accordance with Georgia Department of Transportation Standard Specifications, Construction of Roads and Bridges, latest edition, and any supplemental specifications modifying them.

507 STORMWATER QUALITY BEST MANAGEMENT PRACTICES

Cobb County will utilize the Atlanta Regional Commission's Georgia Stormwater Management Manual, Volumes I and II, as standards for compliance with the federal Clean Water Act (CWA).

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508 RULES FOR ISSUING UTILITY PERMITS GEORGIA D.O.T.

508.01 Requirements for Permits

All utility owners shall be required to apply for and obtain written permission from the Department of Transportation before installing or making substantial changes to any utility facilities on the State or Federal-aid Highway system or on projects which the Department has completed. Permits shall also be required to install facilities adjacent to the right-of-way so as to require trimming on the right-of-way, or the cutting of any paved surface for utility maintenance. A separate permit shall be required for each route (as determined by State Route number, or Federal-aid Route number if not on the State Highway System) and each county where the installation is proposed. Service connections which involve setting a new pole on the right-of-way, trenching in the roadbed, cutting of pavement or boring beneath the pavement will require a permit. A blanket permit may be obtained annually to cover all other service connections in each county.

A. Type of Permits

1. General Encroachments Permit - The Department has adopted FORM DOT 413, a copy of which is included in the Appendix, as a general permit to be used for all types of utility installations which encroach on public rights-of-way.
2. Blasting Permit - In addition to the general encroachment permit, a supplemental permit will be required when the utility proposes to do any work involving the use of explosives within or under the roadbed. Form DOT 413-X has been adopted for this purpose and a copy of this form is also included in the Appendix.
3. Public Telephone Permit - The installation of public telephones inside buildings in rest areas will not require a separate permit. For telephone installations located along the roadside, Form DOT 413 will be used and will include a Special Provision requiring removal of the telephone and Provision requiring removal of the telephone and appurtenances within ten (10) days after notice from the Department of Transportation that the permit is rescinded. Application for a permit telephone installation within the public right-of-way shall be accompanied by a certification by the Applicant that neither the Applicant nor others will reimburse the adjacent property owner in any manner for this concurrence in the location of a telephone booth. Applicant shall also certify that no person, persons, or organization, etc., will be granted consideration of any type for the privilege of operating the telephone within the State Highway right-of-way, nor shall any person, person, organizations, ect., outside the Applicant's normal organization be grated a percentage of the revenue, a fixed fee or any compensation of any_nature from the operation of the telephone authorized to operate within the State Highway right-of-way.

- B.** Term and Conditions of Permit - A proposed utility installation must comply with all the applicable requirements and provision of this manual, and any other special instructions or special provisions which the Department may stipulate, before a permit shall be approved. Applicant, in accepting the permit, agrees to abide by the terms and conditions thereof. Failure to company with terms of the permit during the installation, operation and maintenance of utility facilities within the highway right-of-way may result in revocation of the permit and removal of facilities from the right-of-way.

508.02 PERMIT APPLICATION AND APPROVAL PROCEDURE

- A. Where to Apply** - Application for utility encroachment permits shall be made to the Department's District Engineer having supervisory responsibility for the area in which the facilities are to be installed. A State map showing the Department's district boundaries and a listing of the mailing addresses and telephone numbers of the District Engineer are included in the Appendix.
- B. Authority to Approve** - The district Engineer will have full authority to approve permits for routine installations which are in accordance with this manual and located on conventional highways. Limited exceptions to the policies or standards stated herein may be approved by the State Utilities Engineer after appropriate review by District personnel. Installation of utilities across controlled access or limited access highway it shall require approval by the Commissioner or this authorized representative. Permit applications for attachments to bridges must have the approval of the State Bridge and Structural Design Engineer before approval by the District Engineer or State Utilities Engineer. When attachments are to be made to bridges over a railroad, the Applicant must obtain written concurrence of the Railroad before an approval permit will be released by the Department.

Permit applications for blasting will be reviewed by the State Materials and Research Engineer in addition to the District Engineer and may be approved by the State Utilities Engineer.

On active projects, permits will not be approved until adequate provisions are made for incorporation of the facilities into project plans and contract.

Any request for encroachment on Interstate highways involving an exception to the State's policy and standards as described herein shall require the approval of the Federal Highway Administration in addition to the State's approval. Approval of the FHWA will be requested by the Department when required.

- C. Approval of Other Agencies** - Applications for encroachments on State-owned property under control of the Department of Transportation should be made to the Department's District Office on Form DOT 413 in the same manner as for encroachments on State Highways. After review in the District, the application will be forwarded to the State Utilities Engineer for coordination with the other State Departments or agencies involved.

508.03 ALLOCATION OF COSTS

- A. Permit Fee** - There shall be no charge for the issuance of the permit except as required under Chapter 672-11 of the Department's rules.
- B. Installation Costs** - The entire cost of installing, maintaining, repairing, operating, or using the pole line, buried cable, pipeline, or miscellaneous utility facility, [performing miscellaneous operations and any other expense whatsoever incidental to the facilities or operations authorized by the permit, shall be paid by the Applicant.
- C. Reimbursement of Department Expense** - The Applicant shall, in addition to paragraph B, above, reimburse the Department for any reasonable and necessary expense including, but not limited to, extraordinary inspection services by Department personnel, that the Department may incur in connection with the facilities or operations authorized by the permit. The reimbursement to the Department shall be made by the applicant within thirty (3) days after receiving a statement from the Engineer.

- D. Materials Within the Right-of-Way** - The Applicant, upon notification in writing by the Engineer, shall pay a reasonable market price for any materials removed from the right-of-way or destroyed as a result of operations authorized by the permit

508.04 LIABILITY AND CONTROL

- A. Damages Resulting from Installation** – The applicant shall indemnify and hold harmless the State, the Department of Transportation, the members thereof, and all officers, employees or agents of the state or the Department of Transportation, or any political subdivision thereof, against any and all damages, claims, demands, actions, causes of action, costs and expenses of whatsoever nature, which may result from any injury to, or the death of, any persons or from the loss of, or damages to property of any kind or nature, including the highway and highway facilities or structures, property or equipment used or owned by the State or the Department of Transportation, and facilities which now or may hereafter occupy the right-of-way of the said highway, when such injury, death, loss or damages arises out of the construction, installation, maintenance, repair, removal, relocation, operation or use of the pole line, buried cable, pipeline, or miscellaneous utility facility covered by the permit, or out of the miscellaneous operations authorized by the permit.
- B. Injury or Damage to Utilities** - The Department, its Engineer, officers or employees shall not be held responsible or liable for injury or damage that may occur to facilities covered by the permit, or to any connection or connections thereto, by reason of highway maintenance and construction activities or highway contractor or permittee operations. The Department's contractor shall not be held liable for any damage that may occur to utility facilities after the utility owner has been notified of a conflict with construction and given reasonable time to relocate the facilities
- C. Pavement Repair Liability** - Following the patching or tunneling underneath of any paved surface, the applicant shall be responsible for the condition of said pavement, shoulders and patches, and shall upon request from the Engineer, repair to the said pavement, shoulders and patches, and shall upon request from the Engineer, repair to the Engineer's satisfaction any of the said pavement shoulders or patches which become settled, cracked, broken or otherwise faulty.
- D. Protection of Public** - The applicant shall employ any and all methods in performing the operations authorized by the permit which the Engineer may require in order to properly protect the public from injury and the highway from damage. The utility owner shall have sole responsibility for the adequacy and safety of the design and engineering of its facilities.
- E. Inspection of Work** - The Department reserves the right to inspect the work during such periods as the Engineer deems necessary to check compliance with the terms of the permit by the Applicant, and to require the Applicant to correct all deviations from the approved permit. If the Department is required to incur additional or unusual expense to insure compliance with the terms of the permit due to inadequate control procedures by Applicant, Applicant shall reimburse the Department for such additional cost of inspection and any repairs the Department must make to the highway. Any supervision or control exercised by the Engineer shall in no way relieve the Applicant or any duty or supervision control relieve the Applicant from any liability for loss, damage or injury to persons or property as provided in paragraph A., above.

- F. Work by Utility Contractors** - When the Applicant shall contract for any work to be performed on the public right-of-way under authority of the permit, the contractor shall agree in writing prior to beginning work, that such work will be performed in accordance with the Department's current Utility Accommodation Standards and Specifications and be subject to inspection by the Department to insure compliance therewith. The written agreement shall further provide that the Department shall be held harmless for any extra expense or damages to the contractor as a result of any action the Department may require to correct all deviations from the said Standards and Specifications. This agreement may be made a part of continuing contracts or bid contract documents. If not included in the contract, it shall be completed prior to work beginning. A suitable form for the required Special Assurances is included in the Appendix. When any contractor develops a history of poor performance, the Department reserves the right to require the contractor to furnish a surety bond in an amount specified by the District Engineer in accordance with paragraph 3.5, B., below. Upon continued refusal of a contractor to comply with Department rules, regulations and standards, the Department may ban said contractor from working within the public right-of way.
- G. Final Permit Authority** - The decision of the Engineer shall be final and conclusive with respect to any of the conditions, terms, stipulations and provisions of the permit. This shall not foreclose applicant's right of appeal.

508.05 INSURANCE AND BOND

- A. Requirements for Insurance** - When requested in writing by the Engineer, the Applicant or his contractor shall obtain and carry, for the period of time required for the complete installation of the facilities authorized by the permit, including the repair and restoration of the highway facilities, and also during such future periods of time when operations are performed involving the repair, relocation or removal of said facilities authorized by the permit, a liability and property damage insurance policy, or policies, holding the Department harmless from any damages arising out of the operations performed or authorized by the permit. The said insurance shall provide, as a minimum, coverage in the following amounts: \$200,000.00 property damage resulting from any single occurrence, and \$1,000,000.00 for the death or injury of any person, subject to a limit of \$2,000,000.00 for injuries or deaths resulting from any single occurrence. The said insurance policy, or policies, shall be with an insurance company authorized and licensed to do business in the State of Georgia. A copy of the policy, or policies, or certification evidencing same, shall be submitted to the Department's District Engineer having jurisdiction over the area in which the proposed work is located, and must be approved by him, before any work is commenced under the permit.
- B. Requirement for Bond** - When requested in writing by the Engineer, the Applicant or his contractor shall furnish, for the period of time required for the complete installation of the facilities authorized by the permit, including the repair and restoration of the highway facilities, and also during such future periods of time when operations are performed involving the repair, relocation or removal of said facilities authorized by the permit, a surety bond in the amount specified in the Special Provisions of the permit. The bond shall be written by a Surety Company duly qualified and licensed to do business in the State of Georgia. Form DOT 513, as contained in the Appendix, or other form satisfactory to the Engineer, may be used. No work shall be commenced under the permit until the said bond has been submitted to and approved by the Department.

- A. Traffic Control** - A written traffic control plan will be submitted with each permit application for work requested within the rights-of-way. Companies who have a written traffic control plan approved by the Department may meet this requirement by reference to the appropriate parts of the plan in their permit application. During the initial installation or construction of the facilities authorized by the permit, or during any future repair, removal or relocation thereof, or during any miscellaneous operations, the Applicant shall, at all times, maintain flaggers, signs, lights, flares, barricades, and other safety devices as approved by the permit or as the Engineer may reasonably deem necessary to properly protect traffic upon the highway, and to warn and safeguard the public against injury or damage. As a minimum, the Applicant must comply with the Manual on Uniform Traffic Control Devices. The Applicant shall provide a watchman, as required, to maintain said signs, lights, flares, barricades and other safety devices during non-work hours, and shall, upon request furnish the Engineer the telephone number and/or address of such watchman.
- B. Restrictions Against Interference with Traffic** - The Applicant shall so conduct this operations that there will be a minimum of interference with or interruption of traffic upon and along the highway. This applies to both the initial installation and the continuing maintenance and operation of facilities. Except in emergencies, there shall be no interference with or interruption of traffic upon and along the highway until a plan for the satisfactory handling of traffic has been worked out and approved by the local Department Engineer or other person named in the Permit. In emergencies the Applicant shall notify the local Department Engineer or inspector as soon as practical. The Department reserves the right to prohibit any work, which may interfere with traffic movement during times of peak traffic flow.
- C. Restrictions on Access** - It is expressly provided that, with respect to any limited access highway, the applicant, except as hereinafter provided, shall not have or gain direct access, either ingress or egress, from the main traveled way of said highway or its on or off ramps to any of the facilities authorized by the permit, and that access to said facilities from the main traveled way, or on or off ramps of said highway, is absolutely prohibited, either by vehicle or by foot. However, upon notice to the local Area Engineer or his representative that the construction of the authorized facilities pursuant to the permit is to be undertaken, or that an emergency exists and repairs are needed for the immediate protection of property and persons or prevention of injury, the Department may approve direct access for ingress and egress to said authorized facilities from said on and off ramps or main traveled ways, except that no vehicular traffic movement shall be allowed which would cross traffic or be contrary to normal traffic movement. Such permission will only be granted during the actual time of the construction of the authorized facilities or of the emergency, and applicant agrees to take every precaution during such periods to safeguard the highway users. It is understood by the applicant that any violation of the above regulations governing access to limited access highways shall result in a cancellation of the access privileges herein contained.

508.08 MAINTENANCE

- A. General Restrictions** - Applicant shall at all times keep facilities authorized by the permit in a good state of repair from the standpoint of both structure and appearance. The Department may revoke the permit and order removal of any facilities, which become a hazard to the public or the roadway due to improper maintenance

- B. Notice to Department** - The utility shall give 24-hours advance notice to the Department's District Engineer, or his local representative, before undertaking any of the following maintenance activities within the State Highway right-of-way:

- (1) .Any work which requires the blocking of one or more traffic lanes for a period of time in excess of 2 hours.
- (2) Installation of any temporary structures which are to remain on the right-of way.
- (3) The cutting, trimming or spraying of any trees or shrubs within the right-of way.
- (4) Making any pavement cut except in an emergency.
- (5) Making any excavation within the roadbed, which may remain open overnight.

508.09 APPROVAL AND NOTICE OF OTHER AGENCIES

- A. Additional Permit or License** - Nothing in the permit shall be construed to grant rights or imply approval in areas not falling within the authority and jurisdiction of the Department. It shall be the responsibility of the Applicant to determine the need for, and to obtain, such license, permit, or other form of approval, which may be required by the State or local agencies, Federal agencies, or Railroads.
- B. Utilities on Active Construction Projects** - When highway construction is underway, it shall be the responsibility of the applicant to furnish a schedule for making the new utility installation that is compatible with project construction. Written approval of such schedule by the highway contractor shall be furnished to the Department's engineer having jurisdiction over the project prior to beginning work. Upon request the Department will assist in resolving any disputes over work schedules or in arranging for emergency access to utility facilities within an active project.
- C. Notice to Other Utilities** - The applicant shall give due notice to owners of any other know overhead, underground or other utility facilities at the described location which may be impacted by installation of applicant's facility, notifying them of the work proposed under the permit and the date of their proposed work.

508.10 EFFECTIVE PERIOD OF TIME

- A. Term of Permit** - If work begins within twelve (12) months after issuance, and unless otherwise provided in the Special Provision, the permit shall be in effect for an indefinite period of time from and after the date issued, unless sooner revoked by mutual consent or by the Department for failure of the applicant to abide by the terms and conditions of the permit or by operation of law. A permit is automatically revoked when the utility for which the permit is issued ceases or abandons the operations.
- B. Cancellation for Cause** - Failure of the applicant, within a reasonable time after written notice from the Engineer, to comply with any of the terms and conditions of the permit shall be sufficient cause for cancellation of the permit. facilities within an active project.
- C. Assignment or Transfer**- The permit, and the privileges grated, and the obligations of permittee created thereby, shall be binding upon the successors and assigns of the

permittee. Permittee shall give the Engineer written notice of any such notice or any such assignment or transfer within a reasonable time thereafter.

- D. Time Limited on Beginning Work** - If the applicant fails to commence installation of the pole line, buried cable, pipe line, miscellaneous facility, or other miscellaneous operations covered by the permit within twelve (12) months from the date the permit is issued, said permit shall be deemed null and void and all privileges thereunder forfeited, unless a written extension of time is obtained from the Department.
- E. Restriction Against Varied Use** Subject to safety regulations in effect in the State, the following precautionary measures are applicable to pipeline crossings.
- 1. Required Permit Information** - Pipeline crossing permits shall specify the transmittant (or class of transmittants), the maximum working or test pressures (or potential) and the design standards for the carrier.
 - 2. Changes Subsequent to Permit Approval**
 - a. For encased carriers, the utility company will be required to give advance notice of change of transmittant or increase in working or potential pressure.
 - b. For uncased carriers, the utility will be required to renegotiate the occupancy before changing transmittant or increasing working or potential pressure.

508.11 INSTALLATION IDENTIFICATION

In order to identify the work during installation, the permittee shall place a card sign, or signs, on the highway near the work before beginning the installation. The sign shall be visible from the traveled way and shall be placed not less than six (6) feet above the ground and at least one per mile. The sign or signs will be furnished to the Applicant by the Department along with the approved permit.

508.12 COORDINATION OF REQUIREMENTS

In the case of any discrepancy between the requirements of this Manual and the plans or Special Provisions attached to the permit, the following order of control shall govern:

- (1) Plans attached to the permit shall govern over this Manual, and
- (2) Special Provisions shall govern over this Manual and plans attached to the permit.